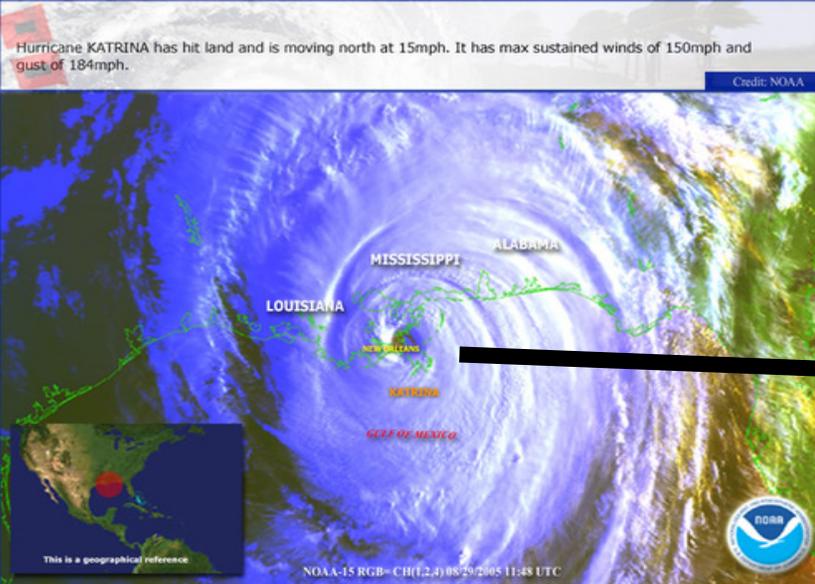


# The Storm: Detailed Hydrodynamics



Co-leads:

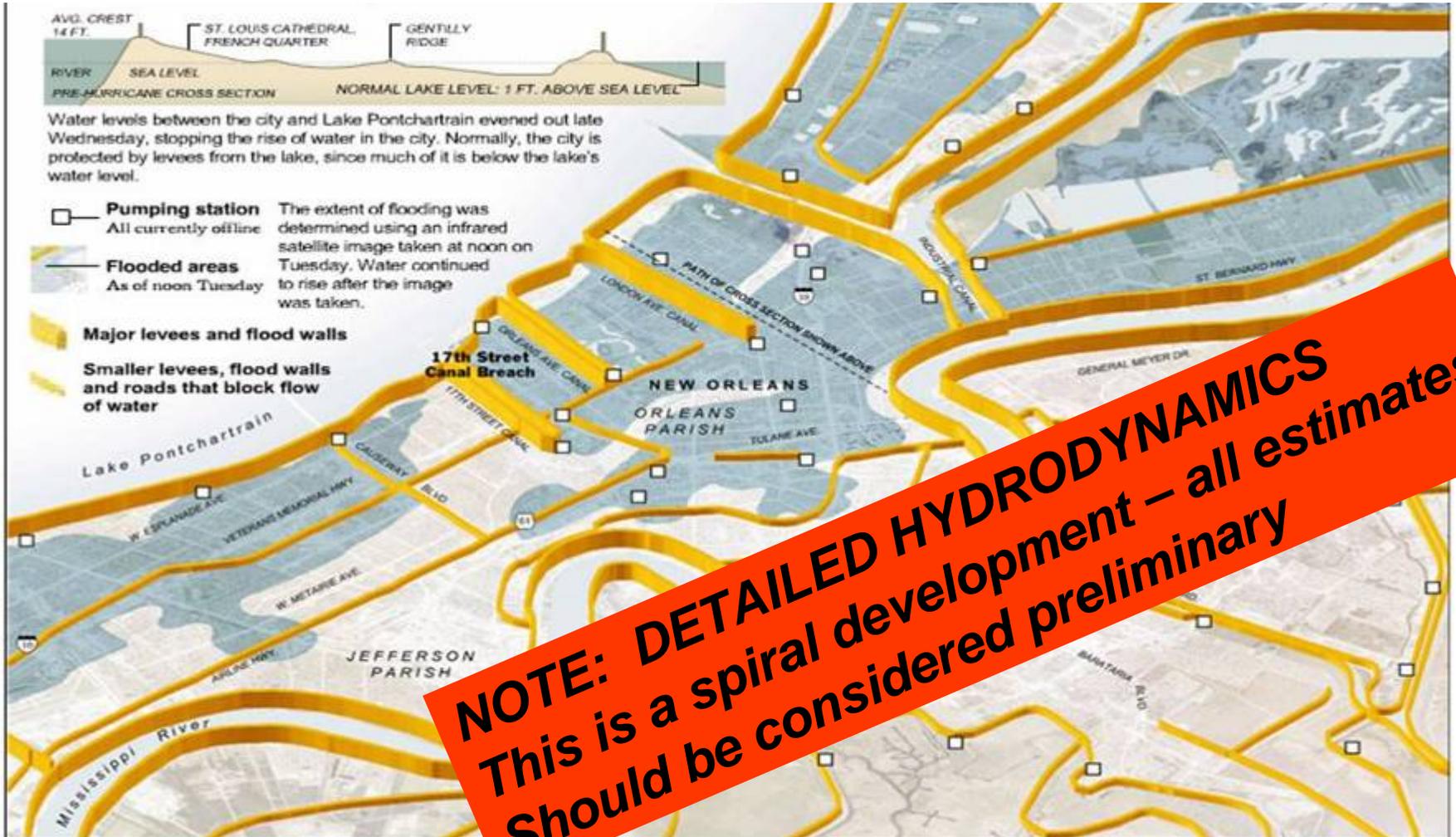
D.T. Resio, Senior Scientist - CHL

R.G. Dean, Professor Emeritus

U. Of Florida



# Hurricane Protection System Greater New Orleans



**NOTE: DETAILED HYDRODYNAMICS**  
 This is a spiral development – all estimates  
 Should be considered preliminary

# Overview of team mission and objectives

Detailed hydrodynamics takes boundary information from larger-scale simulations and focuses on detailed studies in the vicinity of levees

Estimate time varying forces on levees/floodwalls (per unit width) during Hurricane Katrina:

- water levels

- wave fields

- overtopping rates

- vertical distribution of static/dynamic load

- total force/total moment

- near-bottom velocities



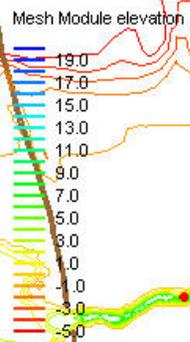
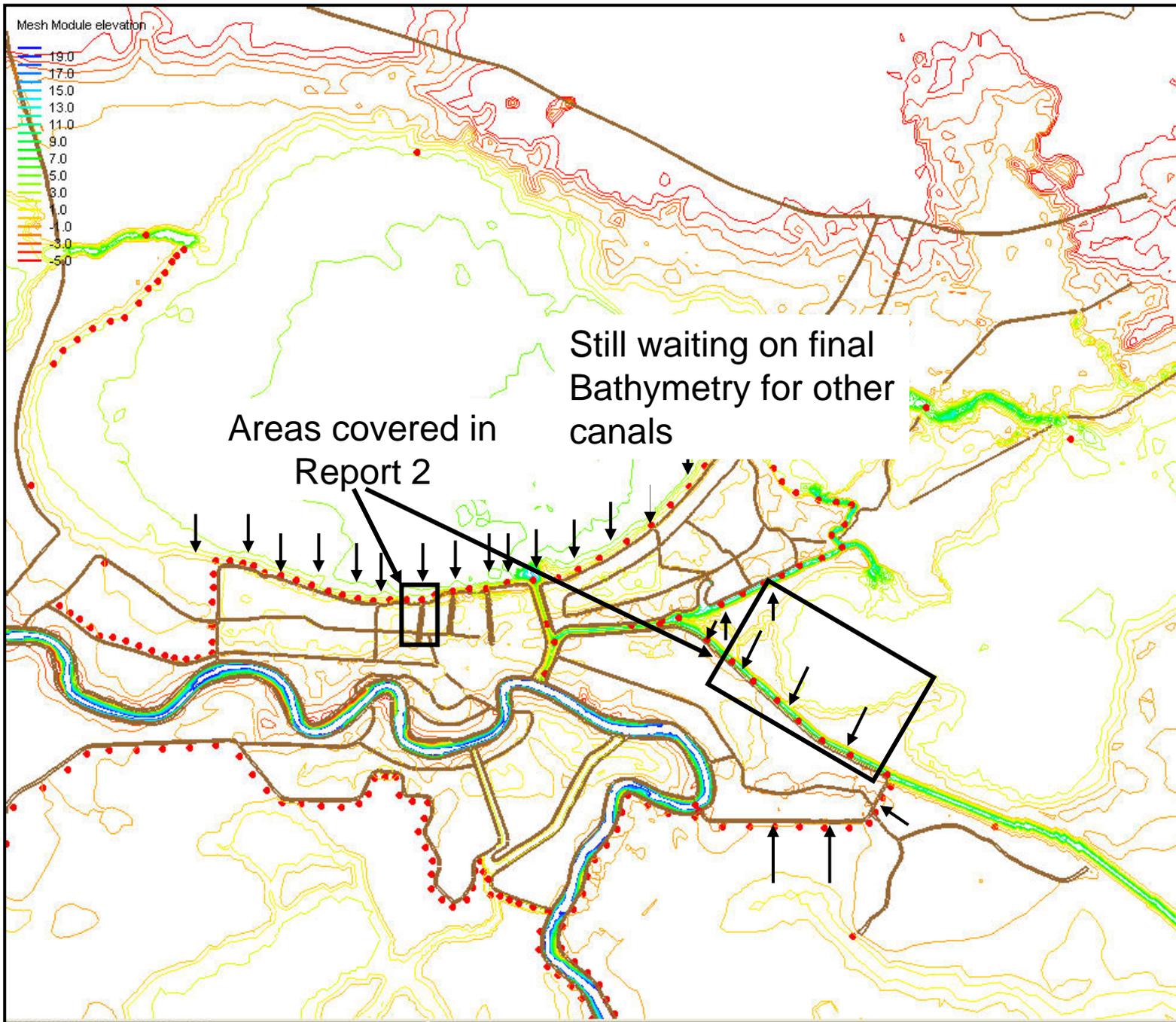
Estimate uncertainty

- model-related – run several models (STWAVE, BOUSSINESQ, PHYSICAL)

- boundary forcing – examine range of boundary values

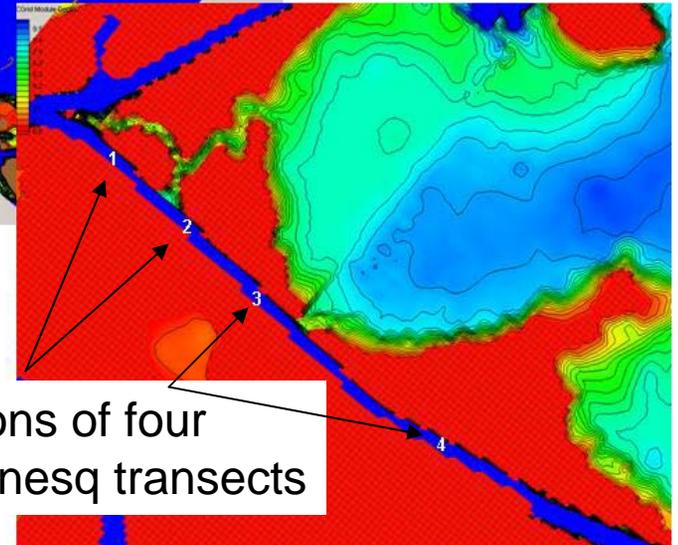
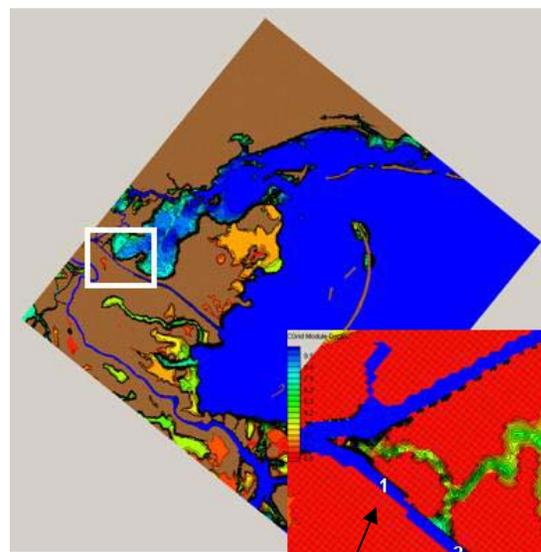
- local forcing [wave/surge generation/decay] – span range of values

Provide results to performance assessment analyses



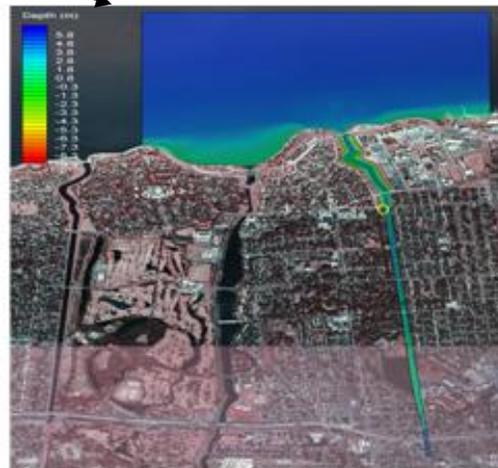
Areas covered in Report 2

Still waiting on final Bathymetry for other canals



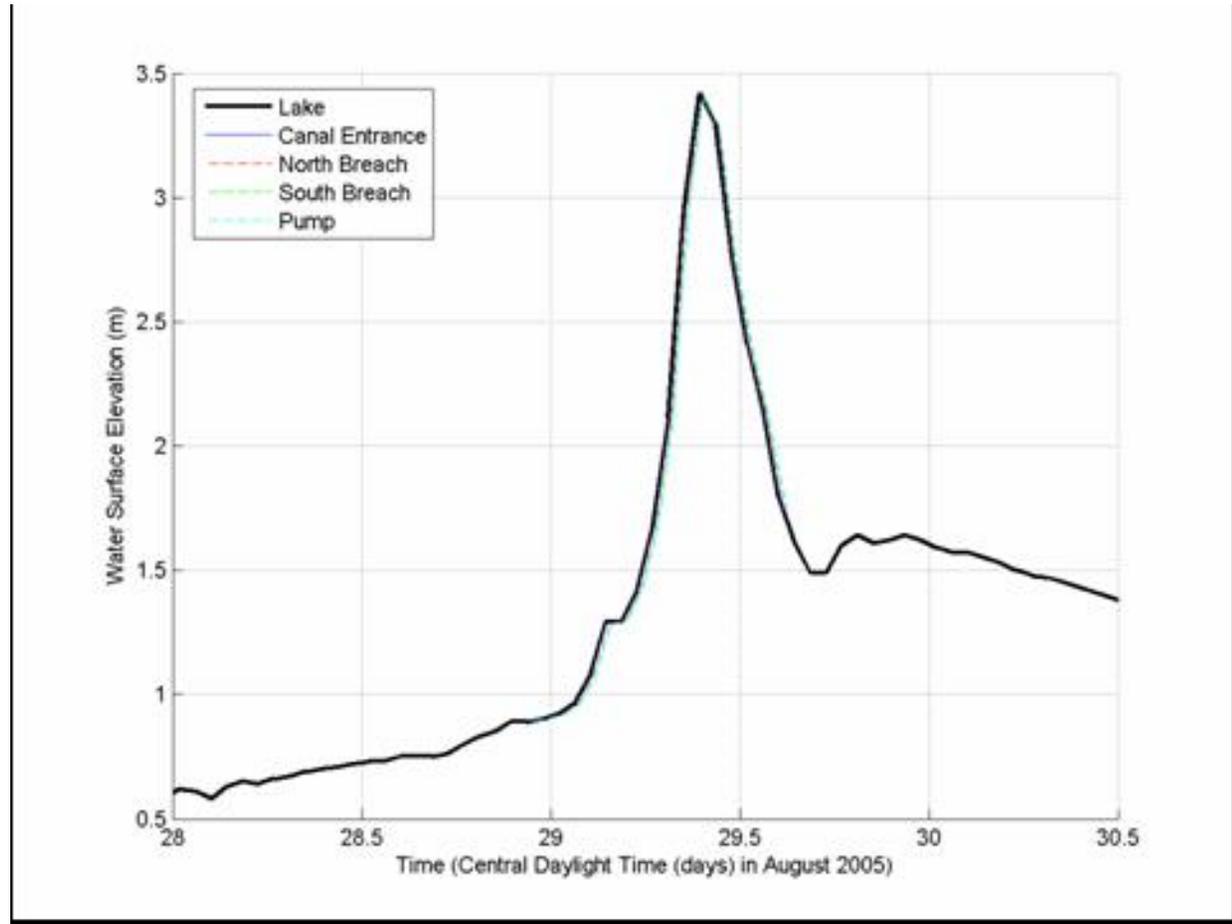
ADCIRC Grids 17<sup>th</sup> Street Canal  
London Avenue

Locations of four  
Boussinesq transects



# 17<sup>th</sup> Street Canal Breach

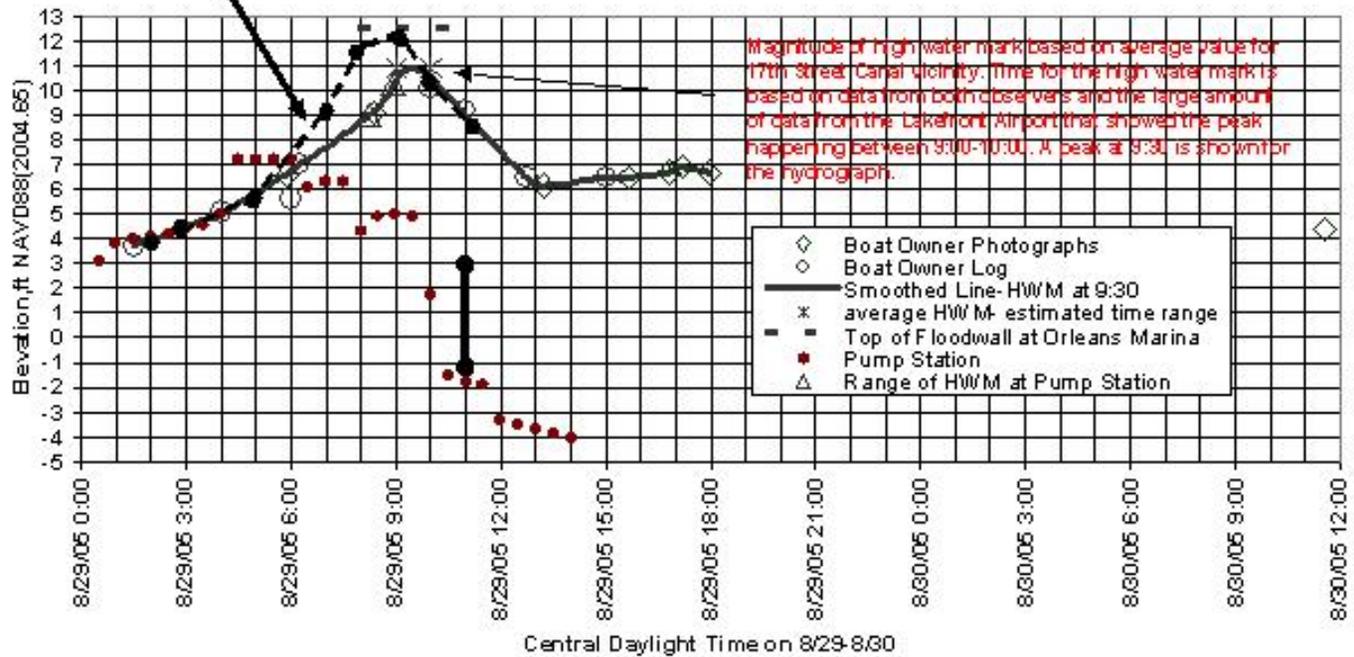


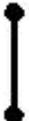


ADCIRC runs show that given no breaching the water levels throughout the canal do not vary substantially in time from the boundary levels or spatially within the canal

# ADCIRC results in Vicinity of entrance to 17<sup>th</sup> Street Canal

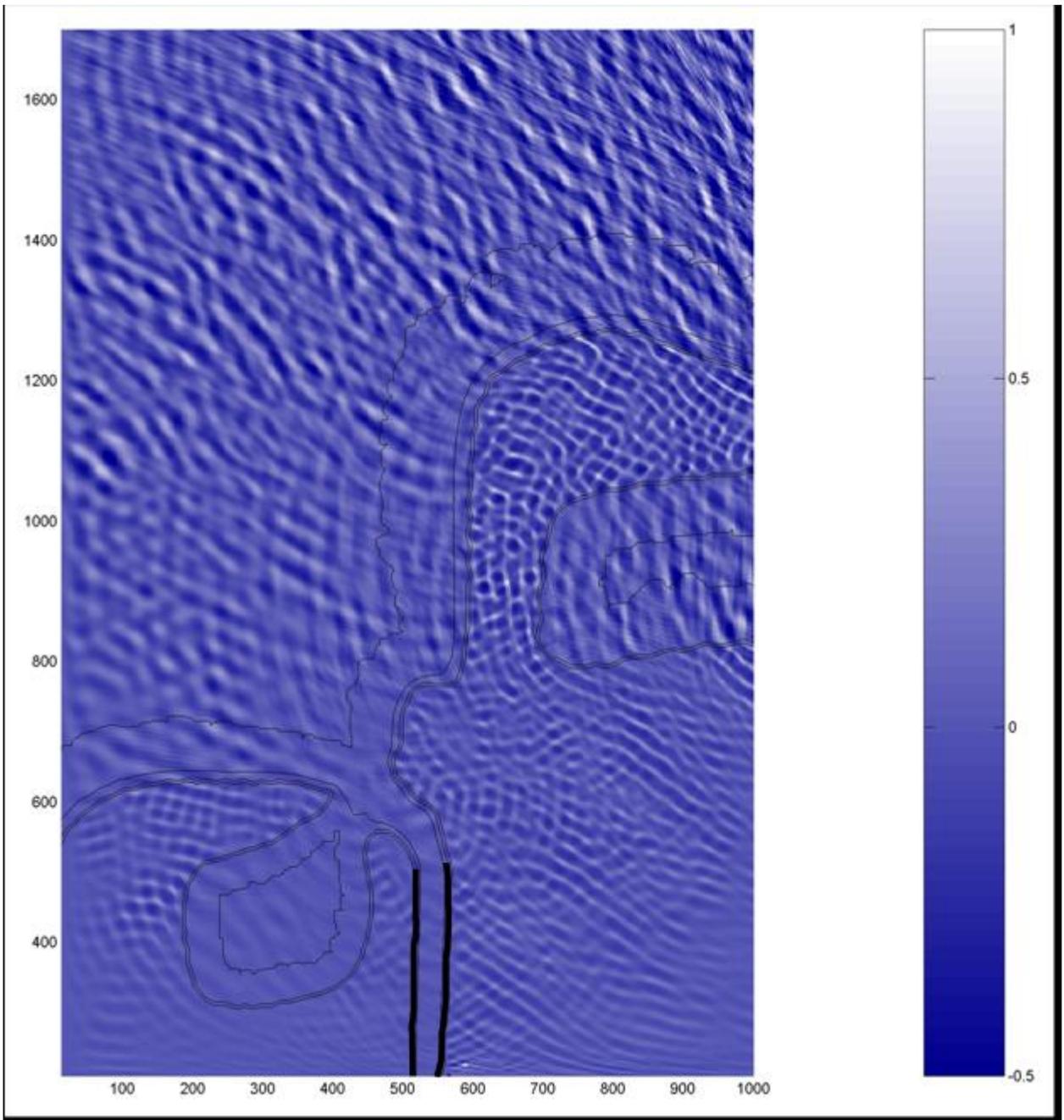
Lake Pontchartrain and Pump Station Hydrograph, 17th Street Canal

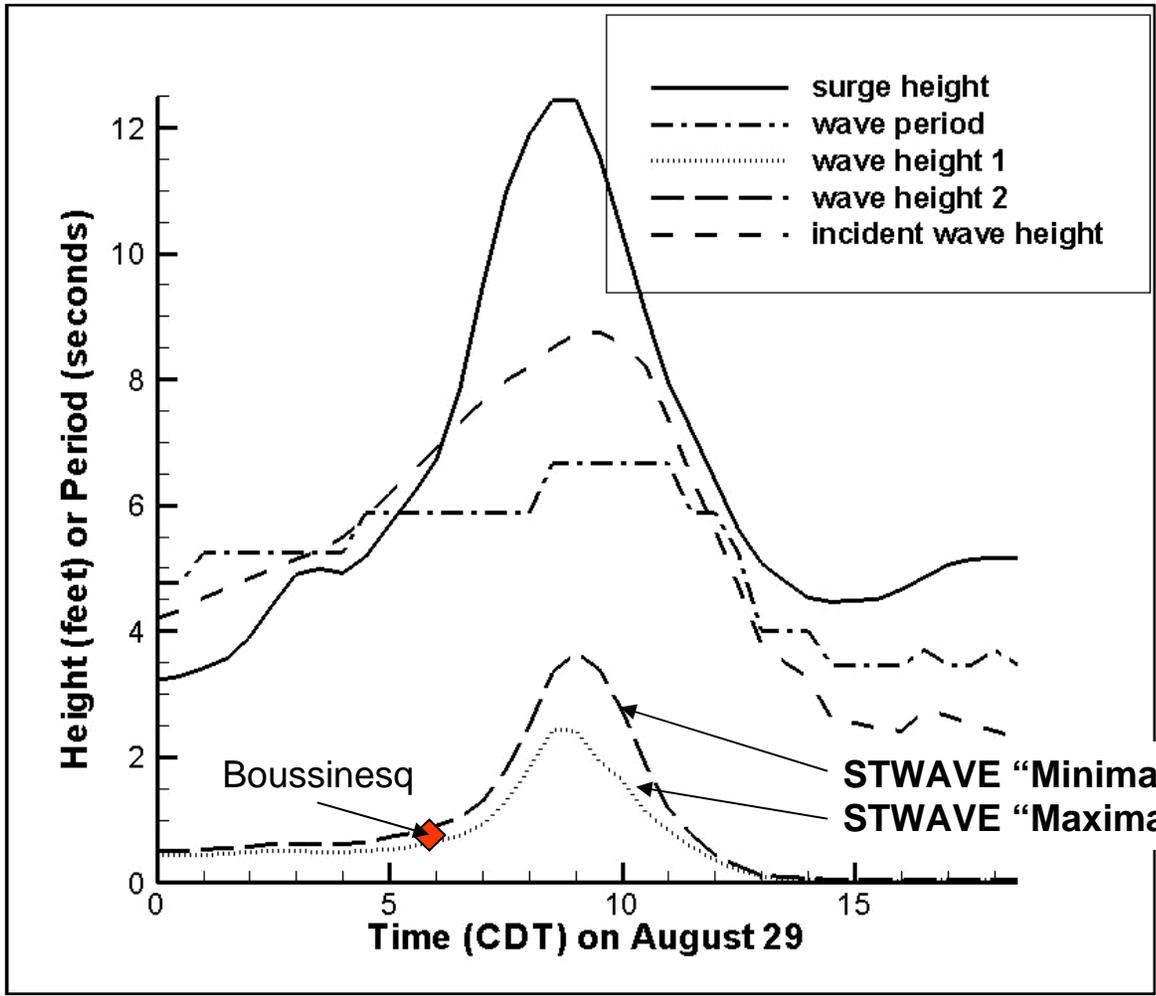


 Preliminary water level estimated from video frames at shortly after 1100 CDT August 29th



Sample surface elevation from Boussinesq simulation at 17<sup>th</sup> Street Canal





STWAVE "Minimal" energy loss  
 STWAVE "Maximal" energy loss

## 17<sup>th</sup> Street Canal 1:50 scale model under construction



Calibration is underway  
Model runs to begin within 2-3 days

**Table V-4  
Percentage Change From Hydrostatic Forces and Moments on a  
Floodwall  
With a Mean Water Depth of 5 feet and a 2 foot Wave Height**

<b>Percentage Change in</b>	<b>Under Crest</b>	<b>Under Trough</b>
Force	+ 44 %	-_36 %
Moment	+73 %	- 49 %

## • *Visualization of products*

Plots of time series (data and plots with uncertainty “bars”)

total force/total moment per unit width

wave heights/water levels at critical locations

overtopping rates per unit width

near-bottom wave and mean-flow velocities (for scour)

Time-vertical plots (static/dynamic/total pressure loads)

Snapshot contours of water levels/wave fields

## *Team members*

D. T. Resio      Senior Scientist ERDC-CHL

R. G. Dean      Professor Emeritus U of FL

J. A. Melby      ERDC-CHL

Co-leads

P. J. Lynett      Texas A&M Universty

N. Kobayashi      U. of Delaware

W. C. Seabergh      ERDC-CHL

J. M. Smith      ERDC-CHL

M. A. Cialone      ERDC-CHL

R. A. Chapman      ERDC-CHL

J. L. Irish      New York District

S. J. Boc      ERDC-CHL

W.R. Dally      Surfbreak Engineering

# QUESTIONS:

Hurricane KATRINA has hit land and is moving north at 15mph. It has max sustained winds of 150mph and gust of 184mph.

Credit: NOAA

